

# Patient Precautions: a Forgotten Piece of the Electronic Patient Record

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*We define "patient precautions" as a unique group of data that is an essential component of the electronic patient record. Patient precautions include medication allergies, difficult airway precautions, infection control precautions, and advance directives. Any piece of data that is associated with the patient, can affect the management of his or her care, and is relatively static over time (as compared with the patient's medication list and problem list) can be considered a patient precaution. An important property of precautions is that the relevant aspects may be brought to the user's attention at the time a patient care decision must be made.*

*We believe this class of data elements is a unique and important component of the electronic patient record that makes it more valuable than the paper record.*

## INTRODUCTION

Parts of the electronic patient record have been widely discussed in the literature. These are problem lists, medication lists, notes, screening sheets, flow sheets, and laboratory reports. Other features, although not often discussed, are assumed to be components of the record. These are the patient's demographic data, visit history, and medication allergies. We propose that medication allergies is not simply another discrete piece of information in the patient's record, but is a subset of a class of entities, which we call "patient precautions."

Patient precautions may be defined as a group of data associated with a patient that affect the management of his or her care. These precautions may be derived from the patient interview, may be routinely captured during patient care activities, or may be automatically captured through laboratory reports, operative reports, or quality assurance activities. These precautions may be viewed by computer users as a collection of precautions of different types, or they may be viewed individually in the context of patient

care. Relative to active problems, medications, and laboratory values, they have permanence in that they are seldom removed from the patient's record and are not subject to rapid change.

It is easy to see how this concept might be useful in dealing with medication reactions or allergies. Precaution-related data may be entered by pharmacists or clinicians, or they may be automatically acquired when a patient is reported to have an adverse drug reaction. Information about the allergy may be viewed at any time the clinician wants to know a specific patient's drug allergies, but more important, this information can be used to intercept orders for medications to which a patient could be allergic. This latter use, that of displaying the relevant patient precaution at the most appropriate time, is an important feature of patient precautions.

## PATIENT PRECAUTIONS

One might think that medication reactions are in a class of their own and are unrelated to other parts of the medical record. But what about food intolerances or food allergies? Doesn't the presence of a food allergy change the diet order we write for a patient in the hospital? And what about patients who are carriers of antibiotic-resistant organisms? Don't we need to know about these patients in order to take the appropriate precautions (e.g., private rooms)? What about advance directives such as "Do Not Attempt Resuscitation"? Don't we need to know about these as soon as a patient enters our health care system?

One can recognize that a large number of precautionary data (see Table) are needed to make various types of decisions about patients. Although the paper record frequently has a brightly colored sticker or notation for some of them, the sheer quantity of precautions that may be associated with a patient can make it difficult to appreciate the relevant precaution at the appropriate time. How many different stickers can appear on the front of a chart?

For example, it is probably not useful to know about all a patient's drug allergies, food intolerances, drug-resistant organisms, and indwelling venous catheters at the same time, although this is what occurs when the paper record is used (assuming the information can even be found). It would be more relevant and less distracting to know about the patient's drug allergies when medications are being selected, food allergies when a diet is ordered, drug-resistant organisms when the patient is being admitted to the hospital, and indwelling catheter when the patient's blood is to be drawn. In this way we can improve the care of patients by using the electronic record, which presents the practitioner with only relevant information, filtering out the data that are, at best, not needed in the particular situation and, at worst, distracting.

#### PRECAUTIONS AND THE PROBLEM LIST

How else might one approach patient precautions? One way would be to place them within the patient's problem list. This would effectively store the information, but has several limitations. One is that the information would not be immediately apparent to the user or to the programs that are used as part of the computerized patient record. This is because there may be many problems on the problem list, making the relevant patient precaution difficult to identify. Therefore, we need some other way to draw

the clinician's attention to these entities, preferably when they are most relevant.

The second problem is associated with reporting and aggregation. It is much easier for an infection control nurse to view data on all patients in the hospital who carry methicillin-resistant *Staphylococcus aureus*, for example, if the data are stored as a patient precaution than if they are simply stored in the patient's problem list, unless these items are indexed as special classes of problems.

Although patient precautions might be entered either through separate routes or through direct entry into the problem list, it is reasonable for them to appear in the problem list. The clinical computing system should identify patient precautions as belonging to a special class of problems so that they can be easily viewed outside the context of the problem list.

#### NEGATIVE FINDINGS AND OTHER CAVEATS

It is important in a system of patient precautions to distinguish between a negative finding and a finding or data item that has not yet been evaluated. For example, in our institution, before a patient's airway has been assessed by an anesthesiologist performing an intubation, that patient's airway status is recorded as "Not Assessed." Once an intubation has been performed, the anesthesiologist who changes the

Table - Types of patient precautions

Class of Precautions	Examples
Drug Reactions/Allergies	Allergy to penicillin
Difficult Airway	Difficult airway
Infection Control	Carrier of antibiotic-resistant organisms Carrier of <i>C. difficile</i>
Food Intolerances/Allergies	Lactose intolerance
Code Status	Do not attempt resuscitation
Medical Device	Cardiac pacer implanted Automatic implantable cardiac defibrillator Faulty device (specifics)
Extremity Precautions	No blood draws or IV's left arm (s/p mastectomy)
Indwelling Venous Catheter	Hickman catheter in left subclavian vein

status may only choose "Normal" or "Difficult." Likewise, in a drug-allergy system, a distinction should be made between "None known" and "Not discussed."

Another issue is that there may be multiple types of precautions within a particular class, such as the various types of infection control precautions and various drug reactions. Databases must be designed to accommodate these.

Another consideration is the importance of a precaution. Whereas pointing out the need to avoid blood drawing in the arm in which a patient has a hemodialysis fistula warrants a precaution, a benign food intolerance because of pyrosis may not warrant such a label.

Finally, it is important to realize that patient precautions are confidential, and should be subject to the same security restrictions applied to other types of patient information. Although it may be necessary to display sketchy information to non-clinicians—e.g., the admitting office should be informed if a patient will require a private room—the details about these precautions should be hidden.

#### AREAS OF OVERLAP

Although we believe that patient precautions make up a unique and separable component of the electronic patient record, there are situations in which demographic information or even problem list information might be used as flags for medical alerts. For example, female patients (demographic data) require reminders about Pap smears, while male patients do not, and diabetic patients (problem list) require reminders about ophthalmologic examinations. Our purpose in separating these out is to make these flags more apparent to users and to the decision modules in the computer programs.

For example, when a patient is found to have a positive stool assay for *C. difficile*, it is more efficient to link that result directly to the list of patient precautions, rather than requiring medical decision modules in the information system to scan through all the patient's microbiology reports, in order to locate the one relevant finding before deciding whether a patient requires a private room.

#### PRECAUTIONS AT BETH ISRAEL HOSPITAL

In addition to medication allergies, the patient precautions used in our institution include difficult airway, infection control, and medical device precautions. These precautions are helpful and important additions to our information system.

Difficult airway precautions allow the department of anesthesiology to maintain a register of patients in whom endotracheal intubation is complicated, therefore requiring special equipment and preparation on the part of the person performing subsequent intubations. A published, closed malpractice claims review<sup>1</sup> demonstrated that 17% of adverse outcomes due to respiratory problems were due to difficult intubations, and a prospective study of almost 300 intubations<sup>2</sup> found that 8% were difficult. Anticipation of these difficult intubations is expected to reduce complications related to airway problems.

At Beth Israel Hospital, this information on difficult airways is gathered during routine computerized quality assurance reviews; data are entered by all anesthesiologists after intubations. Once entered, the data are available for display by clinicians wishing to determine a patient's airway status prior to an intubation, and will ultimately be displayed automatically when an order is placed for an intubation set or when a patient is scheduled to receive general anesthesia in the operating room. In addition, we are currently displaying the airway status to nurses who are doing a computerized patient intake assessment, so they can place a special identification bracelet on patients who are admitted to the hospital.

Another patient precaution that we have instituted is for infection control. Currently, we have precautions related to the most important causes of concern to hospital epidemiologists, that of the proliferation of methicillin-resistant *Staph. aureus* and vancomycin-resistant enterococcus.<sup>3,4,5</sup> The names of patients who have been identified as carriers of either organism from previous microbiology testing are flagged in the computer system by members of the hospital infection control department. When such a patient is admitted to the hospital, the admitting program displays a message to the clerk in the

admitting office or emergency department, indicating that the patient needs a private room for medical reasons. Those who are authorized to view clinical information can view the entire text of the patient precaution. We are planning to introduce other types of infection control precautions, including one for a history of *Clostridium difficile* infection and one for multiple-drug resistant tuberculosis. This system shares some similarities with those implemented elsewhere.<sup>6,7</sup>

Another class of precautions contains medical device precautions. At the end of 1994, Teletronic Pacer Systems predicted that up to 24% of patients given a specific lot of cardiac pacer leads would suffer injuries or death due to fracture and malfunction. Our hospital needed to be alerted whenever patients with these implants arrived in the emergency department or were admitted to the hospital. Although part of the solution to this problem was to use MedicAlert bracelets,<sup>8</sup> this, too, became a type of patient precaution.

#### USE OF PRECAUTIONS AT BETH ISRAEL HOSPITAL

In the first month after making the airway precautions program available, 167 patients had their airway status entered in the computer. Seven of these patients (4%) were felt to have difficult airways. The status of these patients was viewed more than 200 times, excluding lookups by the nurses performing intake assessments.

We are now accumulating data on infection control and medical device precautions.

#### CONCLUSIONS

To meet the needs of clinicians, electronic patient records and clinical computing systems should include the concept of patient precautions. Precautions such as medication allergies, infection control data, and advance directives are an integral part of our electronic patient record and have proved useful for both medical decisions ("Which drug should I prescribe?") and administrative decisions ("Does this patient need a private room?").

Although the components of the paper patient record are commonly considered to be the only essential elements of a computerized patient

record, we have found that the computerized record does not necessarily need to mirror the paper record precisely. We believe we should strive to re-engineer the computerized record to improve on the paper record. Defining data elements, such as patient precautions, is an important step in this process.

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